MILLION Solar ROOFS

SUCCESS STORIES

The goal of the Million Solar Roofs Initiative is to install one million solar energy systems on U.S. buildings by 2010. President Clinton announced the Initiative on June 26, 1997 in a speech before the United Nations Session on Environment and Development. The Initiative focuses on two types of solar energy technology — photovoltaics that produce electricity from sunlight, and solar thermal systems that produce heat for domestic hot water, space heating or heating swimming pools. The U.S. Department of Energy leads this effort in partnership with the building industry, other federal agencies, utilities, the solar energy industry, financial institutions, state and local governments, and non-governmental organizations. These partnerships concentrate on removing market barriers and developing and strengthening demand for solar energy products and applications. As progress is made toward the goal of one million solar roofs, greenhouse gases and other harmful emissions will be reduced, high tech jobs will be created, and the U.S. solar energy industry will retain its competitive edge.

Project: Sun Power for Schools

Type: Grid-connected photovoltaic system

Location: Kaimuki High School, Oahu, Hawaii

Background: Hawaiian Electric Company (HECO) and its subsidiaries, Hawaii Electric Light Company, Inc. and Maui Electric Company, Ltd. launched the *Sun Power for Schools* program in late 1996. The program is a green pricing program that forms a three-way partnership between the utilities, the State of Hawaii Department of Education, and electric utility customers. The utilities are contributing $140,000 over the two-year pilot (1996-1998) to pay for hardware costs of installing demonstration photovoltaic systems at qualifying public schools. In addition, the utilities are contributing labor and covering other costs for administration, technical assistance, curriculum development and marketing the program. Customers are also invited to sign up with voluntary contributions to help increase the number of schools able to receive a PV system. The goal of the program is to install a minimum of 20,000 watts of PV on qualifying schools during the two-year pilot program.

In July 1997, *Sun Power for Schools* made its first installation, a two-kilowatt PV system installed on the roof of the Kaimuki High School gymnasium. The area needed for a two-kilowatt system is about 200 square feet. A qualifying school must have proper sun orientation, roof area, and must not be subject to water leaks. Furthermore, interface to the electrical panel must meet current National Electric Codes.

In addition to the Kaimuki High School installation, the *Sun Power for Schools* program has installed two other two-kilowatt PV systems on the island of Oahu.

A key component of the program is the integration of a renewable energy curriculum into the classrooms at the public schools. Hawaiian Electric personnel are assisting the State of Hawaii Department of Education with this effort.

System Description: The PV modules used in this installation were very easy to install (used standard brackets for PV modules and weatherproof quick electrical connectors).

Each of the PV systems installed on Oahu high schools are designed for two-kilowatt, on-grid PV roof systems. The systems consist of eight ASE Americas modules, approximately 4 x 6 feet each; DC and AC disconnection switches; two-kilowatt Omnion inverter; autotransformer; and data acquisition system.

HECO has an agreement with Ascension Technology, Inc. (ATI) which calls for ATI to package or integrate (with input from HECO electrical and structural engineers) the PV systems. ATI purchased and shipped these PV packages to HECO. ATI also provided the necessary drawings of their PV packages. HECO engineers selected the high school buildings and developed the structural and electrical drawings needed for County permits. HECO hired local electrical contractors and used in-house electricians to install the PV systems on the high school rooftops.

Financing: The Kaimuki PV system was financed by a combination of utility research and development (R&D) contributions, voluntary customer "green pricing" contributions and Federal funding from the Utility Photovoltaic Group (UPVG). UPVG provided about $6,300 for the Kaimuki installation (the first installation). The UPVG cost-share varies with the subsequent installations.

HECO also provided in-kind contributions for this first installation on Kaimuki High School, which was over $20,000 (which includes time for project management, structural, electrical, and drafting personnel). In addition, HECO provided in-kind contributions for the total *Sun Power for Schools* advertising program which totaled over $120,000.

Climate: Operational since July 3, 1997, the PV system is located on the Kaimuki High School gymnasium roof, a building which has a southern exposure and is completely unshaded, maximizing sunlight exposure. This location is about a mile from Hawaii's famed Waikiki beaches. The location gets about 6 to 8 hours of PV productive sunlight daily. There is very little rainfall in this area.

Installed Cost: $23,654 (without in-kind contributions)

Optimum Maintenance Costs: Maintenance costs are about $1000 per year.

Direct Saving: $350-400 per year is the approximate amount that Kaimuki High School saves on its electric bill.

Environmental benefit: Each of the two-kilowatt PV systems is reducing about 5600 pounds of carbon dioxide emissions per year.

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